RHADINOCERAEA N. SP. (HYMENOPTERA: TENTHREDINIDAE) FROM WEST VIRGINIA, A SECOND SPECIES ON *ZIGADENUS* (LILIACEAE)[1]

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ABSTRACT: *Rhadinoceraea sodsensis*, n. sp., is described from West Virginia. Its larvae feed on inflorescences of *Zigadenus leimanthoides* (Liliaceae). This species is separated from the closely related *R. zigadenusae* from coastal Mississippi by reproductive isolation, phenology, and wing morphology. *Rhadinoceraea sodsensis* is univoltine. Adults fly in mid-July, and larvae feed in late July through mid-August.

In this paper, we propose a new species of *Rhadinoceraea* from West Virginia and describe some aspects of its biology. Its closest relative, *Rhadinoceraea zigadenusae* Smith, occurs in southern Mississippi (Smith and McDearman, 1990). Larvae of most sawflies are folivores, but some species consume inflorescences including these two *Rhadinoceraea* species on *Zigadenus*. In the eastern United States, the genus *Zigadenus* occurs along the coastal plain with disjunct populations in the mountains of West Virginia, North Carolina, and Tennessee. Although *R. zigadenusae was* described from adults from Mississippi only, larvae of what were believed to be this species were noted from Alabama, North Carolina, South Carolina, and West Virginia (Smith and McDearman, 1990). We were fortunate to collect a good series of adults and make some observations on a West Virginia population of *Rhadinoceraea*, and, consequently, we compared them with the coastal plain *R. zigadenusae*.

The West Virginia population is reproductively isolated from the coastal plain populations. Further, differences in phenology, morphology, and habits distinguish these populations. Using these criteria, we regard the West Virginia population as a separate, new species closely related to *R. zigadenusae*.

MATERIALS AND METHODS

We located patches of the host plant, *Zigadenus*, and collected and observed *Rhadinoceraea* adults and larvae in and near the Dolly Sods Wilderness and Scenic Area, Tucker and Randolph counties, West Virginia, in 1991-1993. In an attempt to obtain adults, we ran three Cornell-style Malaise traps near South Prong Trail, south of Dolly Sods Picnic Area, from late April through late Sep-

[1] Received May 5, 1995, Accepted June 6, 1995.

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tember 1993. Trap 1 was about 40 m from a host patch with one inflorescence, 150 m from a patch with 50 inflorescences, and 200 m from a patch with thousands of inflorescences. Trap 2 was about 60 m from the host patch with one inflorescence, 200 m from the patch with 50 inflorescences, and 250 m from the patch with thousands of inflorescences. Trap 3 was in the largest patch.

DESCRIPTION

Rhadinoceraea sodsensis Smith and Barrows, NEW SPECIES

Adults.— Identical to *R. zigadenusae* (Smith and McDearman, 1990), except that vein 3r-m is absent in the forewing in 93% of the sample population (Fig. 2).

Holotype.— Female, labeled "West Virginia, Randolph Co., 9 km SE Red Creek, 38°55'N, 79 20'W, 18-VII-1993, on *Zigadenus,* Barrows & Smith." The elevation is about 1,160 m. This is a specimen lacking vein 3r-m in the forewing. Deposited in the National Museum of Natural History, Washington, D.C.

Paratypes.— WEST VIRGINIA: Same data as holotype (19 F. 6 M); same data, 8-18-VII-1993, Malaise trap #1 (3 F); Malaise trap #2 (3 F); Malaise trap #3 (6 F. 4 M); Tucker Co., Dolly Sods, 39°03'N, 79°20'W, 7-V11-1992, 1,220 m (ca. 4000' on label), D.R.Smith (1 M). Deposited with the holotype.

Host.— *Zigadenus leimanthoides A.* Gray (Liliaceae)

Etymology.— The name is derived from part of the name of the collection locality, the Dolly Sods Wilderness and Scenic Area in West Virginia.

DISCUSSION

Larvae of *R. sodsensis* feed on Z. *leimanthoides* which occurs in the coastal plain along the Atlantic Ocean and in boggy areas above about 760 m in West Virginia. In West Virginia, the host flowers from June into August, and it flowers every year (Fernald, 1950; Strausbaugh and Core, 1977). Infestations of *R. sodsensis* may be relatively steady and low over the years. The host of *R. zigadenusae* is *Z. densus* (Descr.) Fernald. which occurs along the coastal plain in wet pine barrens and open swamps from southern Virginia to Florida west to eastern Louisiana. This species flowers in early spring, April to May, in response to fire after which flowering frequency gradually declines over one to three years, depending on habitat, until populations persist only in a vegetative state. *Rhadinoceraea zigadenusae* populations rise and fall with the flowering cycle following fire. Infestation rates reach levels where virtually all flowers in plant populations are consumed (McDearman, personal communication). Adults of both species of *Rhadinoceraea* appear when *Zigadenus* begins to flower. *Rhadinoceraea zigadenusae* flies in April to early May with larval feeding completed in May (Smith and McDearman, 1990), and *R. sodsensis* flies in mid-July with larval feeding completed by mid-August. Since the host in the West Virginia mountains is disjunct by some distance from coastal plain populations, and there is at least a two-month interval between appearance times of

the sawflies, the two sawfly populations are reproductively isolated by space and phenology. Thus, interbreeding in nature is impossible.

Of the 43 adults collected in West Virginia, 3 have vein 3r-m in the forewing (Fig. 1) and 40 lack this crossvein (Fig. 2). Of the 17 from Malaise traps, 1 has vein 3r-m; of the 26 from sweeping, 2 have vein 3r-m. All 14 Mississippi specimens of *R. zigadenusae* have vein 3r-m (Fig. 1). Otherwise, adults and larvae of both populations appear similar. Of the nine North American species of *Rhadinoceraea* this is the only one lacking vein 3r-m.

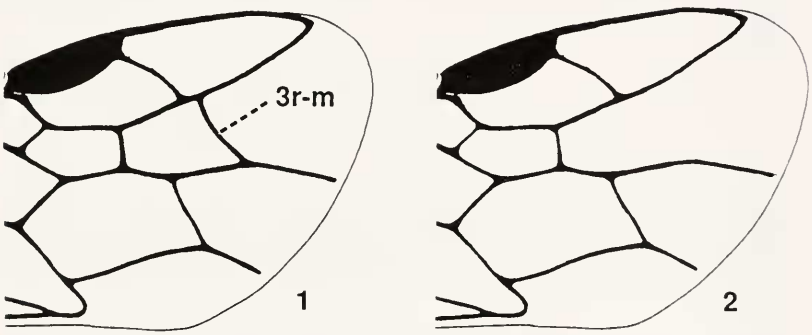

Fig. 1. Apex of forewing of *Rhadinoceraea zigadenusae*. Fig. 2. Apex of forewing of *R. sodsensis*.

One difference in habit was noted. *Rhadinoceraea zigadenusae* typically oviposits into the inflorescence branches among the flowers, whereas *R. sodsensis* oviposits into the main stem of the inflorescence below the flowering branches (McDearman, personal communication).

Field observations.— On July 18, 1991, we surveyed 559 inflorescences in a bog off Northland Loop Trail southwest of Red Creek Campground. Nineteen (4%) of these inflorescences harbored from 1 to 10 larvae. We found 3 inflorescences with 1 larva, 2 with 2 larvae, 4 with 3 larvae, 2 with 4 larvae, 1 with 5 larvae, 2 with 6 larvae, 1 with 7 larvae, 3 with 8 larvae, and 1 with 10 larvae. The infestation rate (plants with one or more larvae) was low compared to the Mississippi populations (nearly 100%), though in late July the infestation rate may have been higher. McDearman (personal communication) found 42% infestation in a *Zigadenus* patch, August 9, 1986, about 1 mile south of Red Creek Campground and estimated that the infested host plants had one or two larvae each.

The adult flight period is about two weeks in mid-July. On July 7, 1992, and July 18, 1993, we net-collected adults. We also collected 17 adults in the Malaise traps, all from July 8 to 18, 1993. We caught 3 females in trap #1, 3

females in trap #2, and 6 females and 4 males in trap #3. A higher catch would be expected in the trap in the large patch of the host. Those from traps 1 and 2 are probably dispersing females.

Every ten days from late July through mid-August 1993, we examined a haphazard sample of from 20 to 35 inflorescences from the largest patch near South Prong Trail and larvae were tabulated from each sample. On July 17, 41 small to medium-sized larvae were found on 15 flowering and 20 budding inflorescences; on July 27, 19 medium to large larvae were taken from 20 flowering inflorescences; on August 7, 9 large larvae were taken from 20 flowering inflorescences; and on August 17 no larvae were found from 20 flowering inflorescences. Thus, the larval feeding period is from mid-July through mid-August.

In conclusion, *R. sodsensis* is univoltine. Its flight period is very short, apparently about two weeks in mid-July, and larvae feed for about 25 days from mid July through mid-August, although flight activity and larval feeding periods are likely to vary from year to year due to weather differences. The West Virginia mountain *Zigadenus* populations are geographically and phenologically isolated; consequently, the sawfly populations are reproductively isolated from one another. The West Virginia *Rhadinoceraea* thus appears to be a distinct species based on isolation as well as phenological and morphological differences.

ACKNOWLEDGMENTS

We thank W. McDearman, Mississippi Museum of Natural Science, Jackson, for allowing use of some of his unpublished notes. The following kindly reviewed this manuscript: W.W. Middlekauff, University of California, Berkeley; H. Goulet, Agriculture Canada, Ottawa; and R. J. Gagné and R.W. Hodges, Systematic Entomology Laboratory, U.S.D.A., Washington, D.C.

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